REMARKS

Claims 1, 2, 4 to 8, 10, 11, and 13 to 21 now appear in the application. By this amendment, claims 1, 2, 5, 7, 8, 11, and 13 to 15 have been amended, claims 9 and 12 have been canceled, and claims 16 to 21 have been added.

In the disclosed and claimed invention, an optical fiber collimator is provided in which the optical axis of an optical fiber is made eccentric with respect to the center of a rod lens so that the center of the lens substantially coincides with the center of a light beam incident on the lens from the optical fiber. Because light rays can be kept parallel over a long distance by the simple way of setting the eccentric quantity to an optimal value, the invention can be applied to all long focal length lenses. Moreover, light beam shading and aberration loss generated can be suppressed so that low insertion loss can be achieved. Hence, the effective diameter range of the lens can be used efficiently.

The is accomplished in a structure generally shown in Figures 1 and 2 and explained in the specification in detail with reference to Figure 6. More specifically, as recited in claim 1 as amended, the optical fiber collimator comprises "a rod lens having an inclined surface", shown at 10, "an optical fiber", shown at 12, and "an optical fiber chip holding an end portion of said optical fiber and having an end surface treated to be inclined", shown at 14. Further, as recited in claim1, "an optical axis of said optical fiber is eccentric with respect to a center axis of said rod lens to thereby set a quantity of eccentricity of said optical fiber so that the center of said rod lens substantially coincides with a center of a light beam incident on said rod lens from said optical fiber". This is shown in both Figures 1 and 6, according to a first embodiment of the invention, and in Figure 8, according to a second embodiment of the invention. New claim 18, dependent on claim 1 adds "a cylindrical member having a through cavity in which said rod lens and said optical fiber chip are inserted from opposite ends thereof so that the inclined surfaces of the rod lens and the optical fiber chip and optical fiber are confronting and spaced from one another a predetermined distance", shown at 18.

Claims 5 and 10 were rejected under 35 U.S.C. §102(b) as being anticipated by Japanese Patent Publication No. JP 62-235909 to Yokota et al. (referred to by the Examiner as "Yokota"). This rejection is respectfully traversed for the reason that Yokota neither shows nor suggests the claimed invention.

Claim 5, as amended, recites an optical fiber collimator which comprises "a rod lens having an optical axis and an inclined surface". Yokota does not show or suggest this structure. Claim 5 further recites "an optical fiber having an optical axis and an inclined end surface" and "a holding member which holds the inclined surface of said rod lens and the inclined end surface of said optical fiber in confronting relation and spaced from one another a predetermined distance so that the optical axis of the optical fiber is located at an eccentric position with respect to the optical axis of the rod lens". Again, Yokota does not show this structure. Moreover, the structure claimed has an important advantage over the Yokota structure in that it can be made more compact, yet produce excellent results as demonstrated by the test results summarized in Figures 4, 5 and 7 as described in the specification.

Claim 10 is dependent on claim 5 and adds that "the holding member includes a cylindrical optical fiber chip having a center and holding the optical fiber on the center thereof, and a cylindrical member holding the lens and the optical fiber chip so that the optical axis of the lens is located at an eccentric position with respect to the center of the optical fiber chip". This is the structure of the second embodiment shown in Figure 8, and there is nothing in Yokota even remotely similar.

Claims 1, 5 and 6 were rejected under 35 U.S.C. §102(b) as being anticipated by German Patent No. DE 39 10 166 to Haltenorth and Frenkel (referred to by the Examiner as "Frenkel"). This rejection is respectfully traversed for the reason that Frenkel neither shows nor suggests the claimed invention.

Claim 1, as amended, recites an optical fiber collimator which comprises "a rod lens having an inclined surface". Frenkel does not show or suggest this structure. Claim 1 further recites "an optical fiber" and "an optical fiber chip

holding an end portion of said optical fiber and having an end surface treated to be inclined". The structure claimed has an important advantage over the Frenkel structure in that it can be made more compact, yet produce excellent results as demonstrated by the test results summarized in Figures 4, 5 and 7 as described in the specification. As mentioned, new claim 18, which is dependent on claim 1, recites "a cylindrical member having a through cavity in which said rod lens and said optical fiber chip are inserted from opposite ends thereof so that the inclined surfaces of the rod lens and the optical fiber chip and optical fiber are confronting and spaced from one another a predetermined distance and an optical axis of said optical fiber is eccentric with respect to a center axis of said rod lens to thereby set a quantity of eccentricity of said optical fiber so that the center of said rod lens substantially coincides with a center of a light beam incident on said rod lens from said optical fiber". Again, Frenkel does not show this structure.

Claim 5 has been discussed above with respect to the rejection based on the Yokota Japanese Patent Publication. Like Yokota, Frenkel does not show "a rod lens having an optical axis and an inclined surface". Moreover, Frenkel does not show "an optical fiber having an optical axis and an inclined end surface" and "a holding member which holds the inclined surface of said rod lens and the inclined end surface of said optical fiber in confronting relation and spaced from one another a predetermined distance so that the optical axis of the optical fiber is located at an eccentric position with respect to the optical axis of the rod lens".

Claim 6 is dependent on claim 5 and adds that "the holding member includes a cylindrical optical fiber chip having a center and holding the optical fiber so that the optical axis of the optical fiber is located at an eccentric position with respect to the center of the cylindrical optical fiber chip". This is the structure of the first embodiment shown, for example, in Figure 1. There is nothing corresponding to the structure recited in claims 5 and 6 shown or suggested by Frenkel.

Claims 1, 2, and 5 to 15 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,682,452 to Takahashi. This rejection is

respectfully traversed for the reason that Takahashi neither shows nor suggests the claimed invention.

Independent claims 1 and 5 have been discussed above. In attempting to read the limitations of the independent claims on Figures 6 and 7 of Takahashi, the Examiner makes statements which are clearly in error. First, the Examiner alleges that "a lens (26); and an optical fiber chip (16) [are] arranged at a distance from said lens". In fact, the ferrule 16 abuts the lens 26 – there is no space between them. Second, the Examiner alleges that "an optical axis of said optical fiber is eccentric with respect to a center of said lens (fig. 7A) to thereby set a quantity of eccentricity of said optical fiber so that the center of said lens substantially coincides with a center of a light beam incident on said lens from said optical fiber". Again, the facts are different. The ferrule 16 a 4-core optical fiber (col. 6, line 23) so that this 4-core optical fiber abuts the lens 26. Therefore, a light beam from the optical fiber eccentric to the lens will not be incident on the center of the lens, as particularly shown in Figure 6 of the present application.

The dependent claims 2, 6 to 8, and 10 to 15 are patentable over Takahashi for the same reasons as independent claims 1 and 5. Claim 2 is dependent on claim 1 and adds that the "rod lens is a gradient index rod lens". Claims 8, 9, 11, and 12 recite similar limiations. The Examiner admits that Takahashi does not disclose such a lens but avers that such a lens is known in the art; however, the Examiner has failed to demonstrate that this combination is suggested by the prior art. Moreover, the Examiner's admission is a clear indication that the rejection under 35 U.S.C. §102 is in error.

Claim 4 was rejected under 35 U.S.C. §103(a) as being unpatentable over the patent to Takahashi. This rejection is respectfully traversed for the reasons set forth above with respect to the rejection of claims 1, 2 and 5 to 15. In rejecting claim 4, the Examiner specifically cites Figure 10 of Takahashi as showing that "the optical fiber chip is made eccentric with respect to the center of the lens." Claim 4 is dependent on claim 1 and is patentable over Takahashi for the same reasons as advanced with respect to claim 1. Claim 4, as amended, recites that "the

through cavity of said cylindrical member has a lens holding hole and an optical fiber chip holding hole formed so that the axes of said holding holes are shifted from each other, said lens and said optical fiber chip being inserted and fixed in said holding holes respectively to thereby be incorporated in said cylindrical member so that said optical fiber chip is made eccentric with respect to the center of said lens in a condition that said optical fiber is inserted and held in an optical fiber insertion hole formed in a center of said optical fiber chip." The Examiner recognizes that Figure 10 of Takahashi shows no holding member of any kind, but alleges such a holding member as specifically recited and shown would be obvious. Applicants dispute this. The fact is that Takahashi is not even related prior art in that the reference is not directed to a collimator but, rather, to an optical coupler having a distinctly different structure and function from the claimed invention.

New claims 16 and 17 have been added to provide applicants with additional coverage of their invention to which they believe themselves to be entitled. As to claim 16, this claim is dependent on claim 2 and recites the relationship set out at the top of page 10 of the specification. Claim 17 is dependent on claim 1 and recites that "the inclination angles of the surfaces of the rod lens and the optical fiber chip and optical fiber are in a range from 4 to 8 degrees." This limitation is supported at page 12, lines 18 and 19, of the specification.

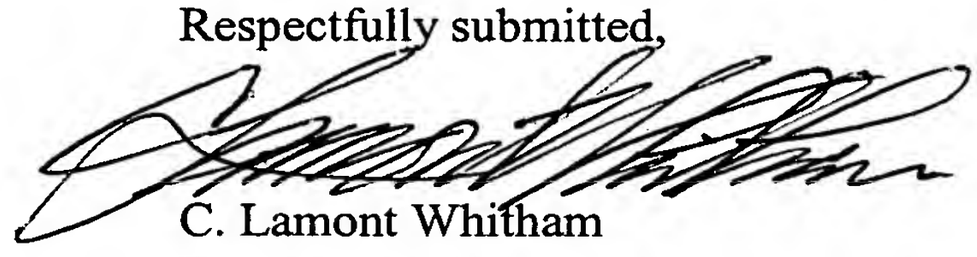
New claim 19 is similar to new claim 18 but dependent on claim 5. Support for claim 18, and therefore for claim 19, is cited above. New claim 20, also dependent on claim 5, recites that the optical path of the optical fiber is eccentric with respect to a center axis of the optical fiber chip. This is shown, for example, in Figures 1, 6 and 8. Finally, new claim 21 is dependent on claim 5 and adds a limitation similar to that recited in claim 13.

In view of the foregoing, it is respectfully requested that the application be reconsidered, that claims 1, 2, 4 to 8, 10, 11, and 13 to 21 be allowed, and that the application be passed to issue.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

A provisional petition is hereby made for any extension of time necessary for the continued pendency during the life of this application. Please charge any fees for such provisional petition and any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041.

Respectfully submitted,



C. Lamont Whitham
Reg. No. 22,424

Whitham, Curtis & Christofferson, P.C.
11491 Sunset Hills Road, Suite 340
Reston, VA 20190
Tel. (703) 787-9400
Fax. (703) 787-7557

Customer No 30743